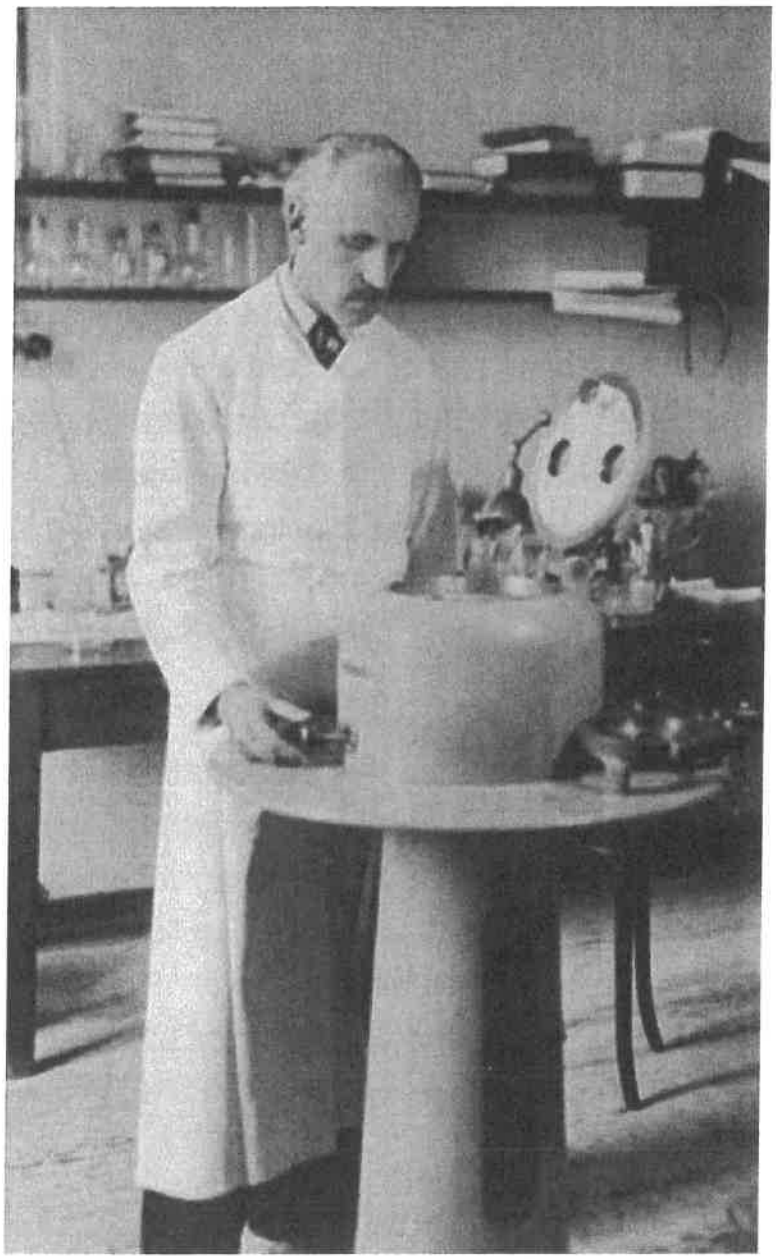
Belgian Society for Microbiology < https://belsocmicrobio.be/>

André Gratia (1893 - 1950)



André Gratia at his centrifuge.
Photograph by G. Rulmont published in the JP Gratia (2000) paper

André Gratia was born in St-Gilles (Brussels-Belgium) on July 8, 1893. In 1910, he started to study medicine at the Free University of Brussels (Université Libre de Bruxelles) but his studies were interrupted in 1914 by World War I. He joined the Belgian army at war and distinguished himself, as an auxiliary doctor. After the war, in 1919, he graduated as a medical doctor and started a research career. As a physiologist, he discovers the coagulase activity of staphylococci, which leads him to become a microbiologist! In 1920, he goes to the Institut Pasteur (Paris) and later to the Rockefeller Institute for Medical Research in New-York. Back to Belgium in 1921, he joined the Department of Bacteriology of the University of Brussels as headed by Jules Bordet. In 1932, he was offered the chair of Parasitology and Bacteriology at the University of Liège where he became full professor in 1934. Unfortunately, he suddenly passed away in 1950 likely due to exhaustion while he arrived in Nyons (Switzerland) for some rest.

During his research at the Rockefeller Institute, he demonstrated that the phenomenon of Twort published in 1915 and that of d'Hérelle published in 1917, both linked to the discovery of bacteriophages, were two manifestations of the same type of agent and he isolated the first bacteriophage of *staphylococci* (1921). This represented the first work on bacteriophages carried out in the United States but since it was published in medical journals rather than in microbiology journals, it escaped to the attention of American historians of microbiology.

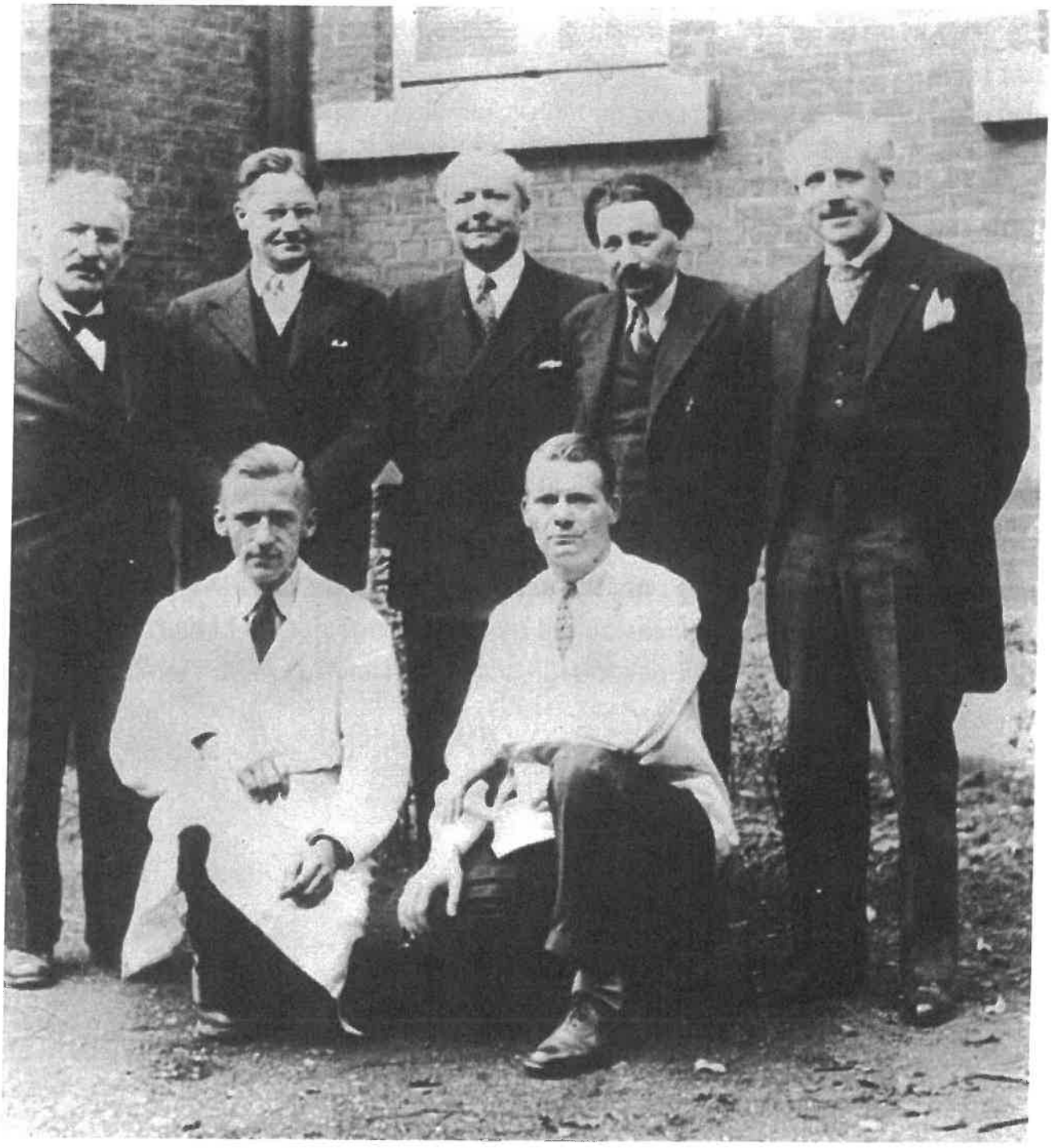
In 1925, Gratia and Sara Dath reported their observations on the bacteriolysis of anthrax-causing bacteria via the "streptothrix", a streptomycete. They realised that the lytic agent was secreted by the mould, even without oxygen. Unfortunately, after this discovery Gratia became seriously ill and had to abandon the lab. When he could resume his work in 1929, the streptomycete strain was dead and therefore lost and Gratia turned all his attention to Coli "V" (see here below). André Gratia is thus a forgotten pioneer of the antibiotic research.

The discovery of André Gratia, for which he is internationally credited is the discovery of colicins in 1925, from *E. coli* "V". Although somehow put in the shade for a while by the fulgurant development of antibiotics, the field of colicins is now actively revisited. Colicins form a group of antibiotics of protein nature requiring the adsorption on specific receptors in the bacterial envelope. Although

Gratia soon established a parallelism between bacteriophages and colicins, he also pointed out the fundamental difference between the two with only bacteriophages being capable of genetic continuity.

In addition, the discovery of colicins and their genetic basis had far reaching consequences in the burgeoning of modern molecular biology via the development of cloning vectors. The plasmidic nature of colicinogenic factors was later established in André Gratia's laboratory by Pierre Fredericq. Colicinogenic plasmids are generally of small size and provided with few restriction sites, which made them a choice material as vehicles for the cloning of foreign DNA. The diversity of colicins could also be illustrated by one of the very last publications of André Gratia in 1950 illustrating a beautiful bench work with Petri dishes displaying the search of new colicinogenic factors.

During his brief career, Gratia made thus major discoveries in the field of antibacterials and this is acknowledged by the homage paid to him on the occasion of his death by famous foreign scientists like Alexander Fleming and Salvador Luria.



Standing: from left to right:

Prof. Selman Waksman (Rutgers University), Nobel Price of Medicine 1952 for the discovery of streptomycin. Prof Waksman recommended the publication of this picture with André Gratia in the book of Ph. Rhodes *An outline of the history of medicine* (Butterworth, London, 1985)

Prof. Howard Florey (Oxford University), Nobel Price of Medicine 1945 shared with Sir Alexander Fleming and Prof E.Chain for the discovery of penicillin.

Prof Jacques Trefouël (Institut Pasteur,Paris), discoverer of sulfonamides.

Prof Ernest Chain (Oxford University), Nobel Price of Medicine 1945 shared with Sir Alexander Fleming and Prof H. Florey for the discovery of penicillin.
Prof André Gratia (University of Liège), discoverer of colicinogenic factors. Prof E. Chain expressly requested Prof. A. Gratia to be present on his side on this group picture.

Foreground:

Dr Pierre Frédericq (University of Liège) who showed that colicins are plasmid encoded. Colicinogenic factors (such as plasmid colE1) were further developed to become major tools in molecular biology.
Dr Maurice Welsch (University of Liège), developed mass production of antibiotics and became Rector of the University of Liège.

Max Mergeay & Guy Cornélis

Sources

Gratia Jean-Pierre (2000): André Gratia: A forerunner in Microbial and Viral Genetics. Genetics 156:471-476
Gratia Jean-Pierre (2001): Microbiologie et Biologie moléculaire en Belgique: Histoire des premiers artisans 203pp L'Harmattan ISBN:2-2475-0973-7
Wainwright Milton (2000): André Gratia (1893-1950): forgotten pioneer of research into antimicrobial agents J. Med. Biogr (2000) 8:39-42
Welsch Maurice (1950): In Memoriam: André Gratia, Acta Clinica Belgica 5-6: 481-485

Gratia A (1921) Preliminary report on a *Staphylococcus* bacteriophage. Proc. Soc. Exp. Biol. Med. 18:192-193
Gratia A (1921) Studies on the d'Herelle phenomenon, J. Exp. Med. 34:115-126
Gratia A (1922) The Twort-d'Hérelle phenomenon: II. Lysis and microbic variation J Exp Med. 1922 35:287-302.
Gratia A & Dath S (1924) Propriétés bactériolytiques de certaines moisissures. C R Soc Biol. 91: 1442-1443 & 92 : 461-462
Gratia A (1925) Sur un remarquable cas d'antagonisme entre deux souches de colibacille C. R. Soc. Biol. 93 :1040-1042
Gratia A, Fredericq P, Joiris E, Betz-Bareau M & Weerts E (1950) The technique of double layer of agar-agar and the distribution of colicine producing germs in normal and pathological fecal matter of man and animals. Antonie Van Leeuwenhoek. 1950;16 :31-37